



Atty. Docket No.: 843.37610X00
Serial No.: 09/381,400

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Yoshinori Miyaki et al.
Serial No.: 09/381,400
Filed: February 3, 2000
For: SEMICONDUCTOR DEVICE AND ITS MANUFACTURING METHOD
Art Unit: 2826
Examiner: Alexander O. Williams

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REQUEST FOR RECONSIDERATION

Assistant Commissioner of Patents
Washington, D.C. 20231

November 19, 2002

Sir:

Claims 22-36 are pending in this application. Applicants request reconsideration of the August 21 Office Action.

The Office Action rejects claims 22-26 under 35 U.S.C. § 103(a) over U.S. Patent 5,637,913 to Kajihara et al. in view of Japan 63-271939 to Yamamoto. The rejection is respectfully traversed.

As will be discussed below, applicants believe that the Office Action has misinterpreted the applied references in order to find the claimed features. In particular, the Office Action now addresses issues and features that are not suggested in the applied references. There is no basis for these features other than applicants' specification and previous arguments. Applicants further believe that the Office Action has failed to make a prima facie case of obviousness. That is, there is no suggestion for the claimed features.

As discussed in the present specification, when using a die pad smaller in size than a chip, an organic film may be selected as an insulating film (i.e., a

passivation film) to cover the main surface of the chip. By using a smaller sized die pad than a chip, an area of a joint between a metal that is comparatively weak in an adhesion strength and a resin body (die pad and sealing resin) may be reduced. In contrast, by increasing an area of the joint between silicon that is comparatively strong in adhesion strength and a resin body (chip and sealing resin), a joint structure of the rear surface of the chip is strengthened. Thus, reflow cracking may be prevented.

The inventors of the present application determined that if a die pad is used that is smaller in size than a chip, and an insulating film on the chip surface is used as an inorganic film (e.g. a silicon oxide film, silicon nitride film or the like), then the adhesion strength between the inorganic film on the main surface of the chip and the sealing resin is relatively weaker than the adhesion strength between the rear surface of the chip (i.e., silicon) and the sealing resin. Due to this, stress problems in the chip surface side may occur as well as undesirable peeling of the chip and the sealing resin, and cracking of the chip.

Based on the recognition of this problem, it was determined that when using a small die pad, an organic film may be selected as an insulating film (passivation film) covering the chip surface. An organic film covering the chip surface may hold the balance relative to an adhesion strength between the respective sealing resins on the main surface and the rear surface of the chip. Therefore, a highly reliable resin sealing type package may be provided that prevents cracks of the resin, peeling of the resin, and cracks of the chip.

Independent claim 22 recites a semiconductor chip having a main surface and a rear surface. The semiconductor chip has a plurality of semiconductor elements and bonding pads formed on the main surface, and an organic film formed to cover the main surface. The organic film has openings exposing the bonding pads. Claim 22 further recites that a size of the die pad is smaller than a size of the semiconductor chip in a plane view.

As discussed below, the applied references do not teach or suggest the claimed features, namely the organic film formed to cover the main surface in combination with the other features.

Applicants previously argued that Kajihara does not teach or suggest the claimed organic film covering the main surface of the chip. The April 4 Office Action asserted that the Kajihara's cross hatching (see FIG. 30) represented an insulative film on top of the chip. However, applicants expressly argued against that Kajihara does not teach or suggest the claimed organic film. Applicants further pointed out that the Office Action's allegation regarding the cross hatching still did not suggest the claimed features. The subsequent August 21 Office Action then asserts that

it is understood to one of ordinary skill in the art to understand that cross hatching representing a insulative film on top of the chip and having an improved reflow cracking resistance (see column 10, lines 29-38).

Applicants expressly disagree with the Office Action's assertion (at page 3, lines 22-26) that one of ordinary skill in the art would understand that cross hatching represents an improved reflow cracking resistance. There is no basis in Kajihara or

any other known prior art for this assertion. Rather, this appears to be a misinterpretation of Kajihara. That is, Kajihara relates to improving a reflow cracking resistance in which the die pad used as a chip mounting portion is smaller in size than the chip. Kajihara does not teach or suggest that an insulating film on the chip has an improved reflow cracking resistance as alleged in the Office Action. The Office Action is improper at least for this reason.

The Office Action then attempts to combine Yamamoto with Kajihara to find the claimed features. In particular, the Office Action asserts that Yamamoto discloses that parts of a resin body contact with an organic film 4, parts of the resin body contact with a portion of the rear surface of a chip 5, and further that the organic film 4 has an improved reflow cracking resistance. See page 4, lines 10-16 of the Office Action.

However, Yamamoto does not teach or suggest a structure in which parts of the resin body contact with a portion of the rear surface of a chip as alleged in the Office Action. Yamamoto also does not teach or suggest that the organic film 4 has an improved reflow cracking resistance as alleged in the Office Action. The Office Action does not address where these features are provided. The Office Action's interpretation of Yamamoto is therefore incorrect.

In spite of this, the Office Action concludes that it would have been obvious to one of ordinary skill in the art to use Yamamoto's photosensitive polyimide organic film to modify Kajihara's insulative film for the purpose of having an improved reflow cracking resistance. This conclusion is entirely improper. That is, this conclusion is

based on several misinterpretations and baseless allegations as discussed above. More specifically, Kajihara does not suggest that an insulating film on the chip has improved cracking resistance. Additionally, Yamamoto does not suggest that parts of the resin body contact with a rear surface of the chip and that an organic film has an improved cracking resistance. Rather, it appears that the Office Action relies on impermissible hindsight to combine the references as alleged and to find the claimed features. More specifically, it appears that the Office Action has misinterpreted (non-discussed) features of the applied references to find features (i.e., the improved cracking resistance) discussed in the August 5 response. The Office Action also relies on these misinterpretations of the references to find the motivation to make the alleged combination. Because these assertions are not based on any proper disclosure, the combination is incorrect. That is, the Office Action fails to provide proper motivation to combine the features as alleged. The Office Action also improperly picks and chooses specific features of the references without any basis and without concern for how/why those features are used in the respective references. As such, the Office Action fails to make a prima facie case of obviousness.

Independent claim 22 therefore defines patentable subject matter. Independent claim 29 defines patentable subject matter for at least similar reasons. Claims 23-28 depend from claim 22 and claims 30-36 depend from claim 29 and therefore also define patentable subject matter. Withdrawal of the outstanding rejection under 35 U.S.C. § 103(a) is respectfully requested.

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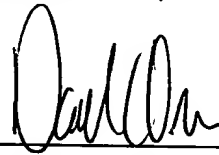
CONCLUSION

In view of the foregoing, it is respectfully submitted that the above identified application is in condition for allowance. Favorable consideration and prompt allowance of claims 22-36 are respectfully requested.

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Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

A handwritten signature in black ink, appearing to read 'David C. Oren', is written over a horizontal line.

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		Examiner Name	Alexander O. Williams
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